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Innovative Pathways to Net-Zero: The Role of Startups in Accelerating Circular Economy Transitions

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ABSTRACT

Startups play a pivotal role in advancing circular economy transitions and achieving sustainability goals, particularly in emerging economies like UAE. This study examines the contributions of two UAE startups, Careem and El Grocer companies, to innovation, scalability, and sustainability, providing insights into their operational dynamics and challenges. A qualitative research design was employed, incorporating semi-structured interviews, organizational document analysis, and observational data. The thematic analysis revealed key themes, including innovation and agility, sustainability practices, scaling challenges, and external influences. Careem demonstrated agility through its use of data-driven innovation and agile frameworks, enabling successful scaling and impactful sustainability practices via shared transportation models. In contrast, El Grocer faced significant operational inefficiencies and scaling challenges, despite its focus on reducing packaging waste and optimizing delivery logistics. Comparative analysis highlighted Careem's ability to benefit from supportive policies and external funding, whereas El Grocer struggled with limited access to sector-specific support. The findings emphasize the critical role of scalable innovation and tailored support systems in enabling startups to overcome challenges and achieve systemic sustainability impacts. Recommendations include adopting agile frameworks, leveraging technology for operational efficiency, enhancing policy and funding ecosystems, and fostering collaboration across industries. This study provides valuable insights for startups, policymakers, and ecosystem enablers aiming to foster innovation and sustainability in the startup ecosystem, ultimately accelerating the transition to a resilient and circular economy.

Keywords: Circular Economy, Net-Zero Targets, Sustainable Innovation, UAE Startup Ecosystem, Scaling Challenges, Transition Management
JEL Classifications: M1, 03, Q01

1. INTRODUCTION

Global climate risk raises existential risks, demanding prompt action to cut greenhouse-fuel emissions and transition to an internet-free economy, rising temperatures, chances for catastrophic weather and biodiversity loss emphasize the vital need for policy change. According to the Intergovernmental Panel on Climate Change (IPCC, 2021), it is vital to limit world temperatures to at least 1.5°C from their operational predecessors and accomplish carbon emissions safe disposal to prevent severe environmental consequences. The concept of a net-zero economic system involves balancing the amount of greenhouse gases emitted with the amount removed from the atmosphere. This equilibrium is achieved by reducing emissions and implementing measures to extract or offset an equivalent amount of greenhouse gases, resulting in no net increase in atmospheric greenhouse gas levels.

In this context, achieving net zero requires a combination of emission reductions and removals, such as through reforestation, carbon capture and storage, or other technologies that extract greenhouse gases from the atmosphere. The goal is to reach a state where human activities no longer contribute to the accumulation of greenhouse gases in the atmosphere, thereby mitigating the impacts of climate change (What Is Net Zero? - Net Zero Climate, 2023). These modifications necessitate inventive methods to eradicate

pollutants from industries, minimize waste, and utilize resources more effectively.

The alignment between the circular economy and the net-zero economic framework has been widely acknowledged in academic and industry discussions. Circular economy principles, including waste management, resource conservation, and ecological regeneration, contribute significantly to achieving net-zero emissions by minimizing waste and reducing greenhouse gas emissions through sustainable practices (Ellen MacArthur Foundation, 2021). According to the World Green Building Council (2023), incorporating circular economy strategies in city planning helps address emissions related to material production, product life cycles, and food systems, thereby supporting net-zero goals. Moreover, businesses leveraging circular economy strategies enhance resource efficiency, decrease waste, and lower emissions, ultimately fostering long-term sustainability (EQT Group, 2023). The National Institute of Building Sciences (2023) further emphasizes that a smart circular economy framework integrates digital technologies and sustainable resource management, providing an effective pathway toward net-zero targets. Additionally, the International Institute for Sustainable Development (IISD, 2023) highlights that transitioning to a net-zero economy requires a fundamental shift from linear extraction-based production to circular, regenerative models that prioritize sustainable resource use. These findings collectively reinforce that circular economic practices are integral to achieving net-zero objectives, requiring a holistic approach that integrates sustainability, innovation, and efficient resource management.

The circular economic model signifies a transformative shift from the traditional linear approach of "take, make, dispose of" to a regenerative system. It emphasizes waste reduction and the extension of product life cycles through reuse, restoration, and recycling. This approach aims to minimize waste and promote sustainable use of natural resources through smarter product design, longer use, and recycling (UNDP, 2022). The European Commission's Circular Economy Action Plan (2020) believes that implementing circular economic system principles could reduce greenhouse gas emissions by up to 50% in sectors such as manufacturing and industry. These advantages illustrate the ability of the circular economy to expedite the shift to net-zero while simultaneously promoting economic resilience and innovation.

Startups play a crucial role in promoting the adoption of circular economic principles. Unlike established organizations, startups are typically more agile, innovative, and willing to experiment with disruptive technologies and business models (Hockerts).

Startups leading advancements in circular financial models include loop, which provides reusable packaging solutions, and too good to go, an application focused on minimizing food waste. By addressing inefficiencies in supply chain logistics, resource recovery, and waste reduction and leveraging next-generation technology, entrepreneurs not only contribute to environmental sustainability but also create scalable business opportunities aligned with net-zero objectives.

The urgent necessity to address the global climate crisis has intensified the emphasis on achieving net-zero emissions and shifting towards a circular economy. This change poses significant challenges, particularly in addressing the limitations of traditional linear economic systems that emphasize resource extraction and disposal. Large corporations often encounter structural and bureaucratic impediments to innovation, but startups have arisen as nimble and inventive catalysts for sustainable solutions.

Despite their capabilities, startups encounter numerous obstacles that hinder their influence on the circular economic system and net-zero objectives. These encompass financial limitations, regulatory obstacles, restricted market access, and difficulties in expanding innovative solutions. Furthermore, there is a deficiency of comprehensive research that elucidates how startups contribute to the circular economy and which methods can augment their role in expediting the transition to net-zero. This research aims to investigate the role of startups in the circular economy, examining their challenges and opportunities, and identifying strategies to enhance their impact on achieving net-zero emissions.

The aim of this study is to examine how startups contribute to the circular economy and expedite the transition to a net-zero economy. Specifically, the research seeks to:

1. Analyze the innovative strategies employed by startups to reduce waste and emissions
2. Identify the challenges and enablers affecting the growth of startups within the circular economy
3. Explore the role of startups in facilitating systemic change towards sustainability
    1. What innovative solutions do startups develop to implement circular economy principles?
    2. What barriers and opportunities do startups face in the context of the circular economy?
    3. How do startups impact the achievement of net-zero targets through sustainable practices?.

This research contributes to the growing body of knowledge on sustainable business practices by focusing on the unique role of startups in advancing circular economy transitions. The findings will provide valuable insights for policymakers, enterprise leaders, and entrepreneurs seeking to foster innovation, conquer systemic boundaries, and create a resilient, sustainable destiny.

2. LITERATURE REVIEW

The shift towards a sustainable global economic framework requires an in-depth reassessment of conventional economic systems and methodologies. Considering the escalating climate crisis, the integration of circular economy principles alongside the ambition for net-zero targets has become essential as a policy approach aimed at alleviating environmental repercussions while simultaneously promoting economic development. This section integrates current scholarly work on the circular economy, net-zero objectives, and the contributions of startups in facilitating sustainable transitions, especially in the context of the UAE.

2.1. Examination of Current Literature on the Circular Economy and Net-Zero Objectives

The transition to a sustainable global economy is driven by the growing need to mitigate environmental degradation and climate change. In this context, two prominent concepts, the (CE) and net-zero targets, have emerged as complementary frameworks. The circular economy challenges the traditional linear economic model of resource extraction, production, and disposal by emphasizing the efficient use of resources, waste reduction, and product life cycle extension. A crucial goal for international climate policies like the Paris Agreement, net-zero targets seek to balance greenhouse gas emissions with their elimination. According to the United Nations (n.d.), the Paris Agreement highlights the necessity of "achieving a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century." This equilibrium is necessary to keep global warming far below 2°C, with the agreement's stated goal of staying under 1.5°C. This section explores the core principles of these frameworks, their synergy in addressing sustainability challenges, and their implications for industries and economies worldwide.

2.1.1. Understanding the concept and principles of the circular economy

The CE embodies a revolutionary framework aimed at confronting the fundamental constraints of linear economic systems defined by "take, make, dispose" methodologies. Originally conceived in the 1960s and subsequently formalized by Pearce and Turner in 1990, the circular economy integrates environmental considerations into economic practices by highlighting the importance of resource efficiency, the reduction of waste, and the prolongation of product life cycles.

The fundamental tenets of the circular economy encompass:

- Resource efficiency: This principle emphasizes the optimization of material utilization and the minimization of waste through methodologies such as recycling, remanufacturing, and reusing (Bocken et al., 2016).
- Waste minimization: This principle emphasizes the importance of designing products and systems with the aim of eliminating the generation of waste (Kirchherr et al., 2017).
- Prolongation of product life cycles: This entails the enhancement of product durability, repairability, and refurbishment to extend usability (Geissdoerfer et al., 2018).

The implementation of these principles is realized through innovative business models, including product-as-a-service models and closed-loop supply chains. These approaches allow organizations to minimize their environmental footprint while simultaneously generating economic value (Stahel, 2016). For example, the Circular Economy Action Plan released by the European Commission in 2020 posits that the implementation of circular economy strategies has the potential to diminish greenhouse gas emissions by as much as 50% in industries such as manufacturing and construction (Upadhayay et al., 2024).

2.1.2. Significance of net-zero targets in mitigating climate change

Net-zero targets seek to achieve a balance between the emissions of greenhouse gases and their subsequent removal from the atmosphere, frequently utilizing mechanisms such as carbon offsets or capture technologies. The targets play a crucial role in international accords, notably the Paris agreement, which aims to restrict global warming to significantly <2°C above pre-industrial levels (Rogelj et al., 2021).

Across the globe, more than 70 nations, the UAE among them, have pledged to reach net-zero emissions by the middle of the century. The United Arab Emirates has taken significant steps towards establishing ambitious sustainability objectives, exemplified by the UAE Net Zero 2050 initiative, which is in harmony with its vision for a sustainable and diversified economy. The incorporation of circular economy practices into net-zero strategies has been recognized as a mutually beneficial method for decreasing emissions while promoting innovation and resilience (Korhonen et al., 2018). Research underscores the significant potential of circular economy initiatives in facilitating the decarbonization of essential industries through waste reduction and the encouragement of sustainable consumption patterns (Ellen MacArthur Foundation, 2019).

2.2. The Contribution of Startups to Circular Economy Transitions

As traditional industries often struggle to adopt disruptive innovations, startups have become critical drivers of sustainability and systemic change. With their agility, risk tolerance, and focus on innovation, startups are uniquely positioned to experiment with and implement circular economy principles. By introducing new technologies and business models, startups can address systemic inefficiencies, reduce environmental impacts, and create scalable solutions aligned with net-zero goals. However, these opportunities come with significant challenges, including financial constraints, regulatory hurdles, and market resistance. This section examines the contributions of startups to the circular economy, highlighting both their transformative potential and the barriers they face in advancing sustainability transitions.

2.2.1. Startups as catalysts of innovation

Startups hold a distinctive advantage in driving innovation within the circular economy, attributed to their inherent agility, willingness to embrace risk, and emphasis on transformative solutions. In contrast to established corporations, startups possess greater flexibility due to the absence of legacy systems, allowing them to engage in experimentation with innovative technologies and diverse business models. For example, Rubicon, a startup based in the United States, utilizes data analytics to enhance waste management practices, leading to a notable decrease in contributions to landfills (Hockerts and Wüstenhagen, 2010).

In a comparable manner, too good to go, a European startup, facilitates the connection between consumers and surplus food sourced from restaurants and supermarkets, effectively diminishing food waste while simultaneously generating new value streams. The examples provided illustrate the way startups incorporate principles of the circular economy into business models that are both scalable and profitable (Bocken et al., 2016).

2.2.2. Challenges and prospects for startups

Notwithstanding their potential, startups encounter considerable obstacles in the execution of circular economic practices:

- Financial constraints: Limited access to funding often hampers the ability of startups to scale their innovations (Kirchherr et al., 2017)
- Regulatory hurdles: Navigating complex compliance requirements can be resource-intensive for startups, particularly in industries like e-commerce and logistics
- Market resistance: Established industries often exhibit reluctance towards the integration of circular business models, which can impede the swift implementation of innovative solutions.

On the other hand, facilitating elements like favorable government policies, availability of innovation networks, and specific funding initiatives can greatly improve the prospects for startups. The United Arab Emirates has initiated programs such as the Dubai Future Accelerators aimed at fostering technology-oriented startups to address global issues, particularly those related to sustainability (Dubai Future Foundation, 2023).

2.3. Theoretical Frameworks and Models Pertinent to the Study

The successful integration of circular economy principles and net-zero strategies within startup operations requires a solid theoretical foundation. This section explores two key frameworks: Sustainable business model innovation (SBMI) and transition management theory. SBMI focuses on reconfiguring traditional business models to integrate sustainability goals, emphasizing value proposition, creation, and capture. Transition management theory, on the other hand, highlights the role of startups as agents of change in disrupting established systems and fostering sustainable practices. By discussing these frameworks, this section provides a structured lens to understand how startups navigate challenges and opportunities in the pursuit of circular economy objectives.

2.3.1. Innovation in sustainable business models

The sustainable business model innovation (SBMI) framework highlights the necessity of reconfiguring conventional business models to attain sustainability objectives. This framework has been extensively developed by scholars such as Bocken et al. (2014), who proposed sustainable business model archetypes focusing on delivering environmental and social value alongside economic benefits. Additionally, Shakeel et al. (2020) advanced the SBMI framework by identifying key dimensions, including sustainable value proposition, value creation and delivery, and value capture, essential for transitioning toward sustainable business models. This framework holds significant relevance for startups, as it seamlessly incorporates economic, social, and environmental objectives into the fundamental strategies of the business (Boons and Lüdeke-Freund, 2013). The essential elements of SBMI encompass:

- Value proposition: Providing products or services designed to have a reduced environmental footprint
- Value creation: Utilizing sophisticated technologies, including artificial intelligence and the Internet of Things (IoT), to improve resource efficiency
- Value capture: The process of generating revenue through sustainability initiatives, which may include the sale of recycled materials or environmentally friendly products.

2.3.2. Transition management theory

Transition management theory offers a framework for understanding systemic change, highlighting the significance of innovation in challenging and transforming established systems (Loorbach, 2010). Startups serve as pivotal catalysts for transformation within this context, as they bring forth innovative technologies and business models that contest conventional methodologies. This methodology is in strong alignment with the UAE's vision for a sustainable economy, emphasizing the critical role of cultivating an ecosystem that is conducive to innovation.

The existing body of literature highlights the critical significance of incorporating principles of circular economy alongside net-zero strategies to effectively tackle the challenges posed by climate change. Startups, characterized by their agility and strong emphasis on innovation, are strategically positioned to drive industry transitions by swiftly adapting to market demands and leveraging emerging technologies. Their capacity to implement innovative business models and disrupt traditional industries is evident in examples such as Airbnb and Uber, which revolutionized the hospitality and transportation sectors, respectively, by utilizing platform-based models and digital transformation strategies (Cusumano et al., 2019). Furthermore, Mazzucato (2018) highlights that startups play a crucial role in pioneering breakthrough innovations and fostering economic growth by challenging incumbent firms through novel technological applications. The ability of startups to pivot quickly and adopt cutting-edge solutions enables them to act as key facilitators in economic and technological transitions, particularly in sustainability and digital transformation. However, they necessitate conducive ecosystems to navigate challenges such as financial limitations and regulatory obstacles. The proactive approach of the UAE towards sustainability, along with its dedication to nurturing entrepreneurship, creates an environment conducive to the emergence of startups such as Careem and El Grocer, which are positioned to develop scalable solutions.

3. METHODOLOGY

3.1. Research Design and Approach

This study employs a qualitative research design to explore the roles and innovations of startups contributing to the circular economy. Given the complexity of the phenomena being studied, such as sustainability practices and resource efficiency within startups, the qualitative approach offers an effective method for gaining insights into these issues in their real-life context. Specifically, this research adopts the case study method, which allows for an in-depth exploration of the dynamics within two prominent startups in UAE that are involved in the circular economy.

By focusing on two startups, Careem and El Grocer, this research aims to examine how modern management practices, particularly in the context of innovation and sustainability, influence business performance and contribute to the circular economy. Through detailed case studies, this research will uncover how these startups operate within the competitive landscape of UAE's startup ecosystem, highlighting both their successes and challenges.

The practical application of the methodology involves conducting semi-structured interviews with key stakeholders within each company, reviewing relevant organizational documents, and observing day-to-day operations. This combination of methods will provide a comprehensive understanding of how startups in UAE navigate the challenges of implementing agile management, driving scalability, and embedding sustainability within their business models.

3.2. Case Study Selection and Justification

The selection of Careem and El Grocer was based on purposive sampling, focusing on startups that represent distinct experiences within the UAE startup ecosystem. The goal was to identify one successful startup that exemplifies best practices in scaling operations, and one startup facing challenges that provides insight into the difficulties startups may encounter in their growth and innovation journey.

3.2.1. Careem: A successful startup

Careem is a technology-driven transportation startup that has made significant strides in revolutionizing mobility in the UAE and internationally. Founded in 2012, Careem offers app-based services ranging from ride-hailing to delivery and digital payments. Its business model has been recognized for its ability to operate efficiently in the competitive urban transport sector while contributing to sustainability goals.

3.2.1.1. Criteria for selection

- Industry reputation: Careem is widely recognized as a leading startup in the UAE, known for its innovation in ride-hailing and its impact on improving urban mobility
- Impact: The company has successfully implemented modern management practices, such as agile methodologies, to adapt quickly to changing market demands and customer needs
- Scalability: Careem has expanded beyond the UAE into numerous international markets, showcasing its ability to scale its operations while contributing to the circular economy through shared transportation models that reduce urban congestion and emissions.

3.2.1.2. Key data sources

- Interviews with leadership teams, including founders and senior managers, focusing on innovation, scaling strategies, and sustainability practices
- Input from employees involved in logistics, app development, and product marketing to gain insights into the company's operations and challenges.

3.2.2. El grocer: A startup facing challenges

El Grocer is an e-commerce platform that provides grocery delivery services by connecting customers with supermarkets and retailers across the UAE. The company has successfully carved out a niche in the online grocery market by offering a seamless shopping experience and forming partnerships with major retailers (RST Software, 2023). However, like many online grocery platforms, El Grocer faces challenges in scaling its operations, particularly in optimizing delivery logistics and maintaining high service quality as demand increases. Issues such as last-mile delivery inefficiencies, rising fulfillment costs, and ensuring timely deliveries remain key hurdles (FarEye, 2023). Addressing these operational challenges is crucial for sustaining growth and enhancing customer satisfaction in the competitive UAE e-commerce landscape.

3.2.2.1. Criteria for selection

- Challenges in scaling: El Grocer provides valuable insights into the struggles of managing growth in the competitive e-commerce industry, especially in balancing delivery capacity with customer expectations
- Operational efficiency: The company's difficulties in maintaining consistent service quality highlight the importance of modern management practices in overcoming logistical bottlenecks
- Relevance to circular economy: El Grocer's focus on reducing food waste through efficient inventory management and minimizing its carbon footprint via optimized delivery routes aligns with circular economy principles.

3.2.2.2. Key data sources

- Interviews with senior managers from logistics, customer experience, and technology teams to understand the company's challenges and strategies for improvement
- Analysis of operational and customer feedback reports to identify recurring issues and opportunities for enhancing efficiency and sustainability.

The selection of Careem and El Grocer allows this research to explore contrasting experiences within the UAE startup ecosystem. Careem represents a success story of scalability and innovation with a significant sustainability impact, while El Grocer highlights the operational and logistical challenges faced by startups in resource-intensive sectors. These two case studies provide a comprehensive view of the factors driving and hindering growth, innovation, and sustainability in the context of the UAE's circular economy.

3.3. Data Collection Methods

In this research, multiple methods of data collection were used to gather a rich, multi-faceted perspective of the two selected startups. The data collection methods are outlined as follows:

3.3.1. Semi-structured interviews

Semi-structured interviews were conducted with key individuals in both startups. The interviews aimed to provide deep insights into how modern management practices, particularly those focused on scaling, efficiency, and innovation, are implemented within the organizations. The following groups were interviewed:

- Senior managers: Key figures within the startups, including founders, CEOs, and senior managers, were asked about their decision-making processes, management strategies, and challenges faced while scaling their companies
- Employees: Interviews were also conducted with employees from operations, product development, and customer-facing departments to understand how these strategies impact day-to-day activities and morale.

3.3.2. Organizational documents and observation

To supplement the interview data, relevant documents from each startup were reviewed, including:

- Careem: Growth strategies, investor reports, and agile project management templates. These documents provided insights into the company's business model, sustainability practices, and strategies for scaling operations
- El Grocer: Operational plans, customer feedback reports, and supply chain management documents. These documents were used to understand how El Grocer operates and where inefficiencies or challenges exist.

4. DATA ANALYSIS

To gather comprehensive insights, semi-structured interviews were carried out with founders, senior managers, and employees of Careem and El Grocer. Additionally, organizational documents such as growth strategies, customer feedback reports, supply chain management documents, and operational plans were meticulously reviewed.

4.1. Responses Collected from Interviews

4.1.1. Careem: Technology-driven transportation startup

- **On innovation and agility**
  - *"Our approach to agility has been transformative. We use agile project management to adjust quickly to market demands and challenges."*
  - *"By using data analytics, we can optimize routes dynamically and respond to commuter needs effectively."*

- **On sustainability**
  - *"Our business model inherently reduces congestion and emissions by promoting shared transportation, which is a sustainable alternative to personal vehicles."*

- **On scaling challenges**
  - *"International expansion required a shift in our operational strategy. We had to integrate local market insights while maintaining consistency in service quality."*

- **On external support**
  - *"Supportive policies for shared transportation and sustainable urban mobility have been pivotal in driving our growth."*

4.1.2. El grocer: E-Commerce and delivery startup

- **On innovation and agility**
  - *"While we've innovated in subscription-based grocery delivery, scaling our operations without sacrificing quality has been a persistent challenge."*

- **On sustainability**
  - *"We've been focusing on reducing packaging waste and optimizing delivery routes to minimize our carbon footprint."*

- **On scaling challenges**
  - *"The biggest hurdle is balancing customer satisfaction with op erational efficiency. As we scale, maintaining consistency in delivery times and quality has been difficult."*

- **On external support**
  - *"Accessing funding tailored for startups focused on sustainability has been a challenge, and regulatory hurdles further complicate scaling operations."*

4.1.3. Key data points from organizational documents

1. **Careem**
- Growth strategies: Rapid expansion into international markets through partnerships and investments.
- Sustainability reports: Metrics showing reduced urban congestion and emissions by promoting shared rides.

2. **El Grocer**
- Customer feedback reports: Highlighted delivery inconsistencies as a major issue.
- Operational Plans: Emphasis on improving warehouse efficiency and delivery logistics.

4.1.4. Observational data

1. **Careem**
- Observed seamless integration of departments to adapt quickly to operational demands
- Efficient use of technology to manage commuter feedback and optimize routes.

2. **El grocer**
- Warehouse operations showed inefficiencies in sorting and packaging during peak hours
- Delivery staff faced logistical challenges in adhering to delivery windows.

The responses for Key Themes obtained are summarized in Table 1.

4.2. Data Analysis Techniques

4.2.1. Thematic analysis

The thematic analysis identified several key themes that capture the critical aspects of innovation, scalability, sustainability, and external influences in the operations of Careem and El Grocer. These themes were derived from qualitative data collected through interviews, organizational documents, and observations.

4.2.1.1. Innovation and agility

1. Careem
- Careem's ability to rapidly adapt to market demands and challenges was a recurring theme.

Table 1: Summarized responses for key themes

Theme	Careem (responses)	El grocer (responses)
Innovation	Agile frameworks and data-driven route optimization	Subscription model with focus on customer retention
Sustainability	Shared rides reduce urban congestion and emissions	Reducing packaging waste and optimizing logistics
Scaling challenges	Balancing international expansion with quality	Struggles in scaling while maintaining service quality
External support	Benefited from government incentives for mobility	Lack of funding and regulatory complexities.

- The company uses agile management practices to enable swift decision-making and implementation, particularly when scaling into international markets.
- A strong focus on data-driven innovation was evident, with Careem leveraging analytics to optimize routes and improve customer experience.

2. El Grocer
- El Grocer's innovation centers on its subscription-based grocery delivery model, which simplifies customer purchasing behavior
- However, its agility is constrained by operational complexities, particularly in logistics. This limits its ability to innovate as quickly as Careem.

3. Comparison
- While Careem exemplifies agility and scalability in a tech-driven environment, El Grocer struggles to replicate this level of innovation in its resource-intensive e-commerce operations.

4.2.1.2. Sustainability practices

1. Careem
- Careem's shared transportation model significantly reduces urban congestion and emissions, aligning with circular economy principles.
- Sustainability is embedded in its core operations, offering an environmentally friendly alternative to private car usage.

2. El Grocer
- El Grocer focuses on reducing packaging waste and optimizing delivery routes to minimize its environmental footprint.
- Despite these efforts, its sustainability practices are relatively localized and lack the systemic impact seen in Careem's model.

3. Comparison
- Careem demonstrates scalable sustainability practices that directly address systemic inefficiencies, while El Grocer's efforts are smaller in scope and impact.

4.2.1.3. Scaling challenges

1. Careem
- Scaling internationally was identified as a key challenge for Careem, requiring the company to adapt its operational strategies to different markets
- Despite these challenges, its agile frameworks and digital infrastructure facilitated relatively smooth scaling.

2. El Grocer
- El Grocer's primary challenge lies in balancing customer demand with operational capacity. Issues such as delivery delays and logistical inefficiencies were highlighted as barriers to scaling
- Unlike Careem, El Grocer lacks a robust operational framework to support rapid growth.

3. Comparison
- Careem's agility allows it to address scaling challenges effectively, while El Grocer faces persistent hurdles due to its reliance on physical logistics and resource-intensive processes.

4.2.1.4. External challenges and support

1. Careem
- Government policies promoting sustainable urban mobility were a significant enabler for Careem
- Access to venture capital and partnerships with international stakeholders also contributed to its success.

2. El Grocer
- El Grocer encountered regulatory hurdles and struggled to secure funding tailored to its sustainability-focused business model
- The lack of external support was a recurring theme, limiting its ability to innovate and scale effectively.

3. Comparison
- While Careem benefited from a supportive policy and funding ecosystem, El Grocer's challenges underscore the need for sector-specific support mechanisms.

The thematic analysis results obtained are summarized in Table 2.

4.3. Comparative Analysis

The comparative analysis revealed that while Careem exemplifies a scalable, innovative approach with a strong sustainability impact, El Grocer showcases the challenges faced by startups operating in resource-intensive sectors like e-commerce. This contrast underscores the need for tailored strategies that address sector-specific barriers while leveraging best practices from successful models like Careem.

1. Comparing themes across cases:
- Innovation and scalability: Careem demonstrated advanced scalability strategies through agile management, while El Grocer faced challenges in maintaining operational quality during growth
- Sustainability practices: Careem leveraged shared transportation models to reduce urban congestion, whereas El Grocer focused on minimizing packaging waste and optimizing delivery routes.

2. Identifying best practices: The analysis highlighted Careem's use of agile frameworks and data-driven decision-making as best practices for achieving scalability and operational efficiency. While El Grocer's focus on sustainability in packaging and delivery logistics provided insights into practices that could be further developed for better scalability
3. Understanding contextual factors: The startups' unique industries significantly influenced their operational dynamics. Careem's position in the tech-driven transportation sector

Table 2: Summary of thematic analysis results

Theme	Careem (key findings)	El Grocer (key findings)
Innovation	Agile, data-driven innovation	Subscription model; limited agility
Sustainability	Shared transport reduces emissions	Focused on reducing packaging waste
Scaling challenges	Effective adaptation to global markets	Struggles with logistics and quality
External support	Benefited from supportive policies	Regulatory and funding hurdles persist

allowed rapid scaling, while El Grocer's e-commerce model faced logistical challenges tied to physical goods.

4. Identifying strategic gaps and opportunities: El Grocer was found to lack a robust scaling strategy compared to Careem, pointing to an opportunity to adopt agile methodologies and optimize logistical operations. Both startups could benefit from enhanced policy support and funding tailored to their specific sectors.

5. DISCUSSION

The findings from this research shed light on how startups in the UAE ecosystem, such as Careem and El Grocer, contribute to innovation, scalability, and sustainability within the circular economy. While both startups operate in distinct industries, their challenges and successes offer a nuanced understanding of the dynamics between innovation and operational efficiency.

1. Innovation and agility

- Careem's adoption of agile management and data-driven approaches exemplifies how startups can leverage innovation to overcome market and operational challenges. Its ability to rapidly scale across international markets underscores the importance of flexibility in business models
- Conversely, El Grocer demonstrates how industry-specific challenges, such as logistics in e-commerce, may limit the direct application of agile practices. The company's focus on innovation in packaging and delivery routes shows promise but lacks the robustness needed to scale efficiently.

2. Sustainability practices

- Careem's shared transportation model contributes to urban sustainability by reducing emissions and congestion, aligning directly with circular economy principles. This highlights how scalable business models can integrate sustainability as a core component
- El Grocer focuses on reducing packaging waste and improving delivery logistics. However, its efforts remain localized and lack the systemic impact observed in Careem's operations. This discrepancy suggests that scalability is a key determinant in the overall sustainability impact of startups.

3. Scaling challenges

- Both startups face scaling challenges, but the nature of these challenges varies. Careem's difficulties arise primarily from adapting to international markets, whereas El Grocer struggles to maintain operational efficiency while meeting increasing customer demand
- The findings suggest that sector-specific strategies are critical for addressing scaling challenges. While Careem benefits from leveraging digital solutions, El Grocer may need to explore partnerships or automation to enhance its logistical operations.

4. External support

- Policy and funding play a pivotal role in the success of startups. Careem's growth was aided by favorable policies and investment opportunities in the mobility sector, whereas El Grocer struggled with limited access to sector-specific funding and regulatory hurdles
- This highlights the importance of creating a supportive ecosystem for startups in diverse sectors, particularly those focused on sustainability.

6. CONCLUSION

This study highlights the critical role startups play in advancing circular economy transitions and achieving sustainability goals. By examining the experiences of Careem and El Grocer, the research identifies key factors influencing the success and challenges of startups in UAE.

1. Careem demonstrates that scalability, agility, and innovation are essential for driving sustainability at scale. The company's success in integrating shared transportation models with agile management practices offers a blueprint for startups aiming to achieve systemic impact
2. El Grocer, on the other hand, reveals the operational and logistical hurdles that startups face in resource-intensive sectors. Despite its commitment to sustainability, the company's challenges in scaling highlight the importance of adopting robust logistical strategies and accessing sector-specific support.

6.1. Recommendations

• For startups

1. Adopt agile frameworks: Startups, particularly those in resource-intensive sectors like El Grocer, should adopt agile management practices to enhance their ability to scale efficiently while maintaining quality standards
2. Leverage technology for operational efficiency: Incorporating advanced technologies, such as artificial intelligence and automation, can help streamline logistics and reduce inefficiencies, particularly for e-commerce startups
3. Focus on scalability in sustainability efforts: Startups should design sustainability practices that are scalable and have a systemic impact, as seen in Careem's shared transportation model.

• For policymakers

4. Provide sector-specific support: Develop funding programs and incentives tailored to different sectors, particularly for startups in heavy logistics industries like e-commerce, to address unique operational challenges
5. Streamline regulatory frameworks: Simplify regulatory requirements to reduce entry barriers for startups and encourage innovation, especially in sectors that directly contribute to the circular economy
6. Promote collaboration and innovation networks: Foster collaboration between startups, larger corporations, and research institutions to facilitate knowledge sharing and resource pooling.

• For investors and ecosystem enablers

7. Increase access to funding: Create venture capital funds or grant programs focused on sustainability-driven startups to enable growth and scalability

8. Mentorship and capacity building: Provide mentorship programs to guide startups in adopting best practices for scaling, sustainability, and operational efficiency
9. Encourage cross-sector collaboration: Support partnerships between startups in different sectors to leverage complementary strengths, such as pairing logistics expertise with technological innovation.

By implementing these recommendations, stakeholders can support startups in overcoming challenges and maximizing their contributions to the circular economy. This will not only enhance the success of individual startups but also foster a more sustainable and resilient ecosystem in the UAE and beyond.

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